

# Exhibit 4

Samsung – Smartphones and Tablets (models with IR cameras, models having cameras with IR sensitivity, and models with the Iris Scan feature. See Product List at end for models)

**Infringement of the '112 patent**

Claim 1	Evidence
1. A method of measuring the magnitude of electromagnetic radiation in a selected location by a mobile communication device, comprising the steps of:	<p>The Samsung smartphone performs a method of measuring the magnitude of electromagnetic radiation in a selected location.</p> <p>For example, when the IR sensor is used for temperature sensing, or the IR camera is used to take an IR image (e.g. as in a scenic photo or for the Iris Scan feature) the smartphone measures the magnitude of infrared electromagnetic radiation received by the smartphone's IR camera (or IR sensor) from the location at which the IR camera/sensor is aimed.</p> <p>For example, the Galaxy S4 and Note 3 models have an IR sensor, which is a smartphone/tablet module that is capable of measuring the magnitude of infrared electromagnetic radiation from an external source.</p> <p><b>Smartphones with thermometers do exist</b></p> <p>The idea is nothing new and manufacturers in their constant pursuit of innovation did give it a try. Namely, Samsung and Motorola had phones with thermometers once. Samsung did it with the Galaxy S4 and Note 3. According to the instructions for using this feature, measuring the temperature required you to leave the device to cool off from any heat it might have accumulated during use and leave it somewhere so it doesn't get warm from your hands.</p> <p>[1]</p> <p>For example, the Galaxy S21 Plus smartphone includes an IR camera, which</p>

is a smartphone module that is capable of measuring the magnitude of infrared electromagnetic radiation from a location at which the camera is aimed.



Samsung Galaxy S21 Plus - Wide Camera Modified for Near Infrared Sensitivity

[2]

For example, the IR camera of the Galaxy S8, S8+, S9, S9+ and Note 8 models is used for the Iris Scan feature, whereby the IR camera measures the magnitude of infrared radiation reflected by a user's eyes, a location at which the camera is aimed, to distinguish unique characteristics of the user's eyes.

# Why do we use IR(Infrared Ray)? or Iris Scan in Samsung Galaxy S8+?

Last Update date : Oct 30. 2020

In the case of visible ray, Iris pattern can be easily interfered by the reflection from other stray visible light **UV light** is strong enough to sterilize so that it may ingenerate skin aging. For those reasons, iris scan technology uses safer IR.



[3]

	<p>With Iris Scanning, your Samsung Galaxy illuminates your eyes with an IR-LED and snaps an IR photograph. Then, your phone looks at the details of your eyes and compares them to previous pictures. If the phone can verify who you are, then it unlocks.</p>  <p><small>© Hadrian/Shutterstock</small></p>
<p>providing a mobile communication device that comprises an enclosure, a digital imaging sensor having a first field of view, such sensor is for generating a digital image of the selected location,</p>	<p>[4] The Samsung smartphone further provides a mobile communication device that comprises an enclosure and a digital imaging sensor that has a first field of view. The sensor is for generating a digital image of the selected location. For example, the smartphone includes an enclosure for housing a digital image sensor, among other components of the smartphone. The digital image sensor has a field of view (e.g. outwards from the rear of the smartphone) and is for generating a digital image of a subject or location at which it is aimed.</p>

For example the Galaxy S4 has 13.1 MP CMOS image sensor within an enclosure, which is also referred to herein as a housing.

**Samsung SM-T837T Galaxy Tab S4 10.5  
2018 LTE-A US 64GB (Samsung T830)  
Detailed Tech Specs**



[6]

 **Primary Camera System** 

<b>Camera Placement</b> 	Rear
<b>Camera Module</b> 	Samsung S5K3L8
<b>Camera Image Sensor</b> 	<u>CMOS</u> 
<b>Image Sensor Format</b> 	1/3.06
<b>Image Sensor Pixel Size</b> 	1.12 micrometer
<b>Camera Resolution</b> 	4208x3120 pixel
<b>Number of effective pixels</b> 	<u>13.1 MP camera</u>

[6]

For example, the Galaxy S21 has 12MP BSI CMOS image sensor within an enclosure, which is also referred to herein as a housing.

Samsung SM-G990U1 Galaxy S21 FE 5G  
UW TD-LTE US 128GB (Samsung G990)  
Detailed Tech Specs



[7]

[7]

Primary Camera System ⓘ

Camera Placement Rear ⓘ

ⓘ

Camera Module ⓘ Samsung ISOCELL Plus S5K2LD

Camera Image BSI CMOS ⓘ

Sensor ⓘ

Image Sensor 1/1.76

Format ⓘ

Image Sensor Pixel 1.80 micrometer

Size ⓘ

Camera Resolution 4000x3000 pixel ⓘ

ⓘ

Number of effective pixels 12.0 MP camera ⓘ

[7]

[7]

For example, the Galaxy S9+ has a 12.2 MP BSI CMOS image sensor within

an enclosure, which is also referred to herein as a housing.

**Samsung SM-G965U1 Galaxy S9+ TD-LTE**

**US (Samsung Star 2)**



[8]

 **Primary Camera System** ①

**Camera Placement** ① **Rear**

**Camera Image Sensor** **BSI CMOS** ①

①

**Image Sensor Pixel** **1.40 micrometer**

**Size** ①

**Number of effective pixels** **12.2 MP camera**  
**pixels** ①

**Aperture (W)** ① **f/1.50**

**Aperture (T)** ① **f/2.40**

**Zoom** ① **1.0 x optical zoom**

**8.0 x digital zoom** ①

[8]

a computer,

The Samsung smartphone further provides a computer.

For example, the SoC CPU device includes a main processor for performing computational processing.

For example the Galaxy S4 includes a Qualcomm Snapdragon SoC CPU device and RAM memory, as a computer:

<b>Brand</b> ⓘ	Samsung
<b>Model</b> ⓘ	SM-T837T Galaxy Tab S4 10.5 2018 LTE-A US 64GB
<b>Brief</b> ⓘ	T-Mobile USA variant
<b>Released</b> ⓘ	2018 Sep 24
<b>Announced</b> ⓘ	2018 Aug 29
<b>Hardware Designer</b> ⓘ	Samsung Electronics
<b>Manufacturer</b> ⓘ	Samsung Electronics [6]
<b>Application processor, Chipset:</b>	
<b>CPU Clock</b> ⓘ	2350 MHz
<b>CPU</b> ⓘ	Qualcomm Snapdragon 835 MSM8998, 2017, 64 bit, octa-core, 32 Kbyte I-Cache, 32 Kbyte D-Cache, 2048 Kbyte L2, 10 nm, Qualcomm Adreno 540 GPU ⓘ 
<b>Operative Memory:</b>	
<b>RAM Type</b> ⓘ	mobile (LP) DDR4 SDRAM
	1866 MHz ⓘ
<b>RAM Capacity</b> ⓘ	4096 MiB RAM
	3321 MiB user accessible RAM ⓘ [6]

For example, the Galaxy includes a Qualcomm Snapdragon SoC CPU device and RAM memory, as a computer:

	<p><b>Brand</b> ⓘ Samsung</p> <p><b>Model</b> ⓘ SM-G990U1 Galaxy S21 FE 5G UW TD-LTE US 128GB</p> <p><b>Brief</b> ⓘ Photography amateurs and pros-alike can effortlessly edit, post, and share scroll-stopping content. Unlocked single SIM variant of Galaxy S21 FE 5G UW for the US</p> <p><b>Released</b> ⓘ 2022 Jan 4</p> <p><b>Announced</b> ⓘ 2022 Jan 3</p> <p><b>Hardware Designer</b> Samsung Electronics ⓘ</p> <p><b>Manufacturer</b> ⓘ Samsung Electronics</p>
	<p>[7]</p> <p>■ Application processor, Chipset:</p>
	<p><b>CPU Clock</b> ⓘ 2842 MHz</p> <p><b>CPU</b> ⓘ Qualcomm Snapdragon 888 5G SM8350 (Lahaina), 2021, 64 bit, octa-core, 5 nm, Qualcomm Adreno 660 GPU ⓘ</p>
	<p>■ Operative Memory:</p>
	<p><b>RAM Type</b> ⓘ LPDDR5 SDRAM</p> <p>3200 MHz ⓘ</p> <p><b>RAM Capacity</b> ⓘ 6144 MiB RAM</p>
	<p>[7]</p> <p>For example, the Galaxy S9+ includes a Qualcomm Snapdragon SoC CPU device and RAM memory, as a computer:</p>
	<p><b>Brand</b> ⓘ Samsung</p> <p><b>Model</b> ⓘ SM-G965U1 Galaxy S9+ TD-LTE US</p> <p><b>Released</b> ⓘ 2018 Mar 16</p> <p><b>Announced</b> ⓘ 2018 Feb 25</p> <p><b>Hardware Designer</b> Samsung Electronics ⓘ</p> <p><b>Manufacturer</b> ⓘ Samsung Electronics</p>
	<p>[8]</p>

	<p>⌘ Application processor, Chipset:</p> <p>CPU Clock ⓘ 2800 MHz</p> <p><u>CPU ⓘ</u> Qualcomm Snapdragon 845 SDM845 (Napali), 2018, 64 bit, octa-core, 32 Kbyte I-Cache, 32 Kbyte D-Cache, 1536 Kbyte L2, 2048 Kbyte L3, 10 nm, Qualcomm Adreno 630 GPU ⓘ</p> <p>⌘ Operative Memory:</p> <p>RAM Type ⓘ LPDDR4x SDRAM</p> <p>1866 MHz ⓘ</p> <p>RAM Capacity (converted) ⓘ 6 GiB RAM</p> <p>[8]</p>
and an output component for conveying information to an operator;	<p>The Samsung smartphone further provides an output component for conveying information to an operator.</p> <p>For example, the smartphone also includes a touchscreen display for conveying information to an operator.</p> <p>For example the Galaxy S4 includes an AM-OLED touchscreen display:</p> <p><b>Brand ⓘ</b> Samsung</p> <p><b>Model ⓘ</b> SM-T837T Galaxy Tab S4 10.5 2018 LTE-A US 64GB</p> <p><b>Brief ⓘ</b> T-Mobile USA variant</p> <p><b>Released ⓘ</b> 2018 Sep 24</p> <p><b>Announced ⓘ</b> 2018 Aug 29</p> <p><b>Hardware Designer ⓘ</b> Samsung Electronics</p> <p><b>Manufacturer ⓘ</b> Samsung Electronics</p> <p>[6]</p>

<u>❖ Display</u>	
<b>Display Diagonal</b>	266.2 mm 10.5 inch
<b>Resolution</b>	1600x2560 4096000 pixels
<b>Display Width</b>	141.09 mm 5.55 inch
<b>Display Height</b>	225.74 mm 8.89 inch
<b>Horizontal Full Bezel Width</b>	108.21 mm
<b>Display Area</b>	31848.3 square millimeter
<b>Display Area Utilization</b>	77.8%
<b>Pixel Size</b>	0.08818 mm/pixel
<b>Pixel Density</b>	288 PPI
<b>Display Type</b>	Color AM-OLED display
<b>Display Subtype</b>	Super AM-OLED
<b>Display Color Depth</b>	24 bit/pixel
<b>Number of Display Scales</b>	16.8M
	[6]
For example, the Galaxy S21 includes an AM-OLED touchscreen display:	
<b>Brand</b>	Samsung
<b>Model</b>	SM-G990U1 Galaxy S21 FE 5G UW TD-LTE US 128GB
<b>Brief</b>	Photography amateurs and pros-alike can effortlessly edit, post, and share scroll-stopping content. Unlocked single SIM variant of Galaxy S21 FE 5G UW for the US
<b>Released</b>	2022 Jan 4
<b>Announced</b>	2022 Jan 3
<b>Hardware Designer</b>	Samsung Electronics
<b>Manufacturer</b>	Samsung Electronics
	[7]

	<p><b>❖ Display</b></p> <p><b>Display Hole</b> 1-hole</p> <p><b>Display Diagonal</b> 162.9 mm 6.4 inch</p> <p><b>Resolution</b> 1080x2340 2527200 pixels</p> <p><b>Display Width</b> 68.26 mm 2.69 inch</p> <p><b>Display Height</b> 147.91 mm 5.82 inch</p> <p><b>Horizontal Full Bezel Width</b> 6.24 mm</p> <p><b>Display Area</b> 10096.8 square millimeter</p> <p><b>Display Area Utilization</b> 87.0%</p> <p><b>Pixel Size</b> 0.06321 mm/pixel</p> <p><b>Pixel Density</b> 402 PPI</p> <p><b>Display Type</b> Color AM-OLED display</p> <p><b>Display Subtype</b> Dynamic AM-OLED</p>
	[7]

  

	For example, the Galaxy S9+ includes an AM-OLED touchscreen:
	<b>Brand</b> Samsung
	<b>Model</b> SM-G965U1 Galaxy S9+ TD-LTE US
	<b>Released</b> 2018 Mar 16
	<b>Announced</b> 2018 Feb 25
	<b>Hardware Designer</b> Samsung Electronics
	<b>Manufacturer</b> Samsung Electronics

	<p><b>❖ Display</b></p> <table border="1"> <tbody> <tr> <td>Display Diagonal</td><td>158.1 mm 6.2 inch</td></tr> <tr> <td>Resolution</td><td>1440x2960</td></tr> <tr> <td>Horizontal Full Bezel</td><td>4.64 mm</td></tr> <tr> <td>Width</td><td></td></tr> <tr> <td>Display Area</td><td>84.3%</td></tr> <tr> <td>Utilization</td><td></td></tr> <tr> <td>Pixel Density</td><td>529 PPI</td></tr> <tr> <td>Display Type</td><td>AM-OLED display</td></tr> <tr> <td>Display Subtype</td><td>Super AM-OLED</td></tr> <tr> <td>Number of Display</td><td>16.8M</td></tr> <tr> <td>Scales</td><td></td></tr> <tr> <td>Scratch Resistant</td><td>Gorilla Glass 5</td></tr> <tr> <td>Screen</td><td></td></tr> </tbody> </table> <p>[8]</p>	Display Diagonal	158.1 mm 6.2 inch	Resolution	1440x2960	Horizontal Full Bezel	4.64 mm	Width		Display Area	84.3%	Utilization		Pixel Density	529 PPI	Display Type	AM-OLED display	Display Subtype	Super AM-OLED	Number of Display	16.8M	Scales		Scratch Resistant	Gorilla Glass 5	Screen	
Display Diagonal	158.1 mm 6.2 inch																										
Resolution	1440x2960																										
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Display Area	84.3%																										
Utilization																											
Pixel Density	529 PPI																										
Display Type	AM-OLED display																										
Display Subtype	Super AM-OLED																										
Number of Display	16.8M																										
Scales																											
Scratch Resistant	Gorilla Glass 5																										
Screen																											
coupling to the enclosure a module that is responsive to intensity of the electromagnetic radiation in a selected spectral range;	<p>During manufacturing of the smartphone, Samsung couples to the enclosure a module that is responsive to intensity of the electromagnetic radiation in a selected spectral range.</p> <p>For example, the IR camera/sensor of the smartphone is responsive to electromagnetic radiation in the infrared range and is coupled to the smartphone's housing.</p> <p>For example, the Galaxy S4 and Note 3 models have an IR sensor, which is a smartphone/tablet module that is capable of measuring the magnitude of electromagnetic radiation in the infrared range. The IR sensor is coupled to the enclosure of the Galaxy S4/Note 3.</p>																										

## Smartphones with thermometers do exist

The idea is nothing new and manufacturers in their constant pursuit of innovation did give it a try. Namely, Samsung and Motorola had phones with thermometers once.

Samsung did it with the Galaxy S4 and Note 3. According to the instructions for using this feature, measuring the temperature required you to leave the device to cool off from any heat it might have accumulated during use and leave it somewhere so it doesn't get warm from your hands.

[1]

For example, the Galaxy S21 Plus smartphone includes an IR wide angle camera, which is a smartphone module that is capable of measuring the magnitude of electromagnetic radiation in the infrared range. The IR wide angle camera is coupled to the enclosure of the Galaxy S21.



**Samsung Galaxy S21 Plus - Wide Camera Modified for Near Infrared Sensitivity**

[2]

For example, the IR camera of the Galaxy S8, S8+, S9, S9+ and Note 8 models is used for the Iris Scan feature, whereby the IR camera measures the magnitude of electromagnetic radiation in the infrared range that is reflected by a user's eyes to distinguish unique characteristics of the user's eyes. The IR camera is coupled to the enclosure of the Galaxy S8, S8+, S9, S9+ or Note 8 models.

# Why do we use IR(Infrared Ray)? or Iris Scan in Samsung Galaxy S8+?

Last Update date : Oct 30. 2020

In the case of visible ray, Iris pattern can be easily interfered by the reflection from other stray visible light **UV light** is strong enough to sterilize so that it may ingenerate skin aging. For those reasons, iris scan technology uses safer IR.



[3]

	<p>With Iris Scanning, your Samsung Galaxy illuminates your eyes with an IR-LED and snaps an IR photograph. Then, your phone looks at the details of your eyes and compares them to previous pictures. If the phone can verify who you are, then it unlocks.</p>  <p><small>© Hadrian/Shutterstock</small></p>
enabling positioning the enclosure in a vicinity of the selected location;	<p>[4]</p> <p>The Samsung smartphone enables positioning the enclosure in a vicinity of the selected location.</p> <p>For example, the smartphone is handheld and mobile, therefore the enclosure and likewise the IR camera/sensor can be positioned in the vicinity of the location that is the source of infrared radiation.</p> <p>For example, due to the handheld and mobile nature of the smartphone, the smartphone can be positioned such that it is in the vicinity of an external surface emitting infrared radiation in order to take a temperature reading, or</p>

in the vicinity of a subject and pointed thereat to take an IR wide angle image of the subject, or in the vicinity of a user and pointed at the user's eyes to use the Iris Scan feature, as the case may be for a given smartphone/tablet model.

For example, the Galaxy S4 and Note 3 models have an IR sensor. To take a temperature reading, the S4 or Note 3 tablet needs to be placed in the vicinity of infrared electromagnetic radiation from an external source. The handheld and mobile nature of the Galaxy S4 and Note 3 models makes this positioning easy to perform.

## **Smartphones with thermometers do exist**

The idea is nothing new and manufacturers in their constant pursuit of innovation did

give it a try. Namely, Samsung and Motorola had phones with thermometers once.

Samsung did it with the Galaxy S4 and Note 3. According to the instructions for using this feature, measuring the temperature required you to leave the device to cool off from any heat it might have accumulated during use and leave it somewhere so it doesn't get warm from your hands.

[1]

For example, the Galaxy S21 Plus smartphone includes an IR camera. In order to take an IR photo of a subject, the smartphone needs to be positioned so that the IR camera is in the vicinity of the subject and pointed at the subject. The handheld and mobile nature of the Galaxy S21 model makes this positioning easy to perform.



**Samsung Galaxy S21 Plus - Wide Camera Modified for Near Infrared Sensitivity**

[2]

For example, the IR camera of the Galaxy S8, S8+, S9, S9+ and Note 8 models is used for the Iris Scan feature. In order to use the Iris Scan feature, the smartphone needs to be positioned in the vicinity of the user's face with the IR camera pointed at the user's eyes. The handheld and mobile nature of the Galaxy S8, S8+, S9, S9+ and Note 8 models makes this positioning easy to perform.

# Why do we use IR(Infrared Ray)? or Iris Scan in Samsung Galaxy S8+?

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In the case of visible ray, Iris pattern can be easily interfered by the reflection from other stray visible light **UV light** is strong enough to sterilize so that it may ingenerate skin aging. For those reasons, iris scan technology uses safer IR.



[3]

	<p>With Iris Scanning, your Samsung Galaxy illuminates your eyes with an IR-LED and snaps an IR photograph. Then, your phone looks at the details of your eyes and compares them to previous pictures. If the phone can verify who you are, then it unlocks.</p>  <p><small>© Hadrian/Shutterstock</small></p>
enabling the module for generating a signal representative of the electromagnetic radiation;	<p>[4]</p> <p>The Samsung smartphone enables the module to generate a signal that is representative of the electromagnetic radiation.</p> <p>For example, the IR camera/sensor generates a signal responsive to the infrared electromagnetic radiation received from the location or subject at which the IR camera is pointed, or from the vicinity in which the smartphone is placed. The design and manufacture of the smartphone itself enables the IR camera/sensor to generate the signal.</p> <p>For example the IR sensor in the Galaxy S4 and Note 3 models produces a</p>

signal that is used by the SoC processor to provide a numeric temperature reading to the user via the display. The temperature reading is representative of the infrared electromagnetic radiation received by the IR sensor.

### **Smartphones with thermometers do exist**

The idea is nothing new and manufacturers in their constant pursuit of innovation did give it a try. Namely, Samsung and Motorola had phones with thermometers once. Samsung did it with the Galaxy S4 and Note 3.

According to the instructions for using this feature, measuring the temperature required you to leave the device to cool off from any heat it might have accumulated during use and leave it somewhere so it doesn't get warm from your hands.

[1]

For example the IR camera in the Galaxy S21 Plus model generates an IR image signal that is representative of the infrared electromagnetic radiation, e.g. hotter objects appear brighter in the image, which enables a user to distinguish hot objects from colder objects, bare earth from vegetation etc.



**Samsung Galaxy S21 Plus - Wide Camera Modified for Near Infrared Sensitivity**  
[2]

For example, the IR camera of the Galaxy S8, S8+, S9, S9+ and Note 8 models used for the Iris Scan feature generates an image signal responsive to the infrared electromagnetic radiation received from the user's iris.

## IR Scanning is Very Simple

Iris Scanner and Face ID are forms of biometric identification, and they're both used to unlock your phone and to open sensitive apps (banking apps, for example). Both processes are similar and easy to understand. New Apple and Samsung's phones are equipped with an IR-LED that emits near IR light, and an IR camera that is capable of capturing IR light.

With Iris Scanning, your Samsung Galaxy illuminates your eyes with an IR-LED and snaps an IR photograph. Then, your phone looks at the details of your eyes and compares them to previous pictures. If the phone can verify who you are, then it unlocks.



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[4]

enabling processing said signal to extract

The Samsung smartphone enables processing the signal to extract information related to intensity of the electromagnetic radiation in the

<p>information related to intensity of the electromagnetic radiation in the selected location, and</p>	<p>selected location.</p> <p>For example, the main processor in the SoC device processes the signal to extract information of the infrared electromagnetic radiation, in the location of the IR sensor or at which the IR camera is pointed in the case of the IR wide angle camera and Iris Scan feature. The design and manufacture of the smartphone itself enables the SoC device to process the signal.</p> <p>For example the IR sensor in the Galaxy S4 and Note 3 models produces a signal that is used by the SoC processor to provide a numeric temperature reading to the user via the display.[1]</p> <p>For example the IR camera in the Galaxy S21 Plus model generates an IR image signal that is representative of the infrared electromagnetic radiation and provides the image to the user on the display of the smartphone. [2]</p> <p>For example, the IR camera of the Galaxy S8, S8+, S9, S9+ and Note 8 models used for the Iris Scan feature generates an image signal responsive to the infrared radiation received from the user's iris. The SoC device processes the signal to extract information, based in part on the intensity of the received infrared electromagnetic radiation, to determine characteristics of the user's iris. If the characteristics sufficiently match previously recorded characteristics, the SoC unlocks the smartphone. [3] [4] [5]</p>
<p>enabling sending said information to the output component for conveying the information to the operator.</p>	<p>The Samsung smartphone enables sending the information to the output component for conveying the information to the operator.</p> <p>For example, depending on the feature being activated, the SoC processor sends the information to the touchscreen display, which causes the display to be unlocked as in the case of the Iris Scan feature, or to display a temperature, or to display an IR image captured with the IR camera. The design and manufacture of the smartphone itself enables the SoC device to send the information to the touchscreen display. [1] [2] [3] [4] [5]</p>

**Product List:**

**Smartphones with IR cameras:** Galaxy S4 and Note3 smartphones

**Smartphones with wide camera having near IR sensitivity:** Galaxy S21 Plus smartphone

**Smartphones with the Iris Scan feature:** Galaxy S8, S8+, S9, S9+ and Note 8 smartphones/tablets

**References:**

[1] Galaxy S4 and Note3 smartphones

[https://www.phonearena.com/news/can-smartphone-take-temperature\\_id121600](https://www.phonearena.com/news/can-smartphone-take-temperature_id121600)

[2] Galaxy S21 Plus smartphone

<https://www.youtube.com/watch?v=I5rWDvzJJHQ#:~:text=Samsung%20Galaxy%20S21%20Plus%20%2D%20Wide%20Camera%20Modified%20for%20Near%20Infrared%20Sensitivity,-761%20views%201>  
video at 0:08

[3] Galaxy S8, S8+, S9, S9+ and Note 8 smartphones/tablets

<https://www.samsung.com/in/support/mobile-devices/why-do-we-use-ir-infrared-ray-for-iris-scan-in-samsung-galaxy-s8-plus/>

[4] Galaxy S8, S8+, S9, S9+ and Note 8 smartphones

<https://www.howtogeek.com/404731/are-ir-scanners-in-phones-bad-for-your-eyes/>

[5] Galaxy S8, S8+, S9, S9+ and Note 8 smartphones

<https://www.samsung.com/ph/support/mobile-devices/what-is-iris-scanning-and-how-to-use-it-on-my-samsung-galaxy-device/>

[6] PhoneDB: SM-T837T Galaxy Tab S4 10.5 2018 LTE-A US 64GB

[https://phonedb.net/index.php?m=device&id=15072&c=samsung\\_sm-t837t\\_galaxy\\_tab\\_s4\\_10.5\\_2018\\_lte-a\\_us\\_64gb\\_samsung\\_t830&d=detailed\\_specs](https://phonedb.net/index.php?m=device&id=15072&c=samsung_sm-t837t_galaxy_tab_s4_10.5_2018_lte-a_us_64gb_samsung_t830&d=detailed_specs)

[7] PhoneDB: SM-G990U1 Galaxy S21 FE 5G UW TD-LTE US 128GB

[https://phonedb.net/index.php?m=device&id=19575&c=samsung\\_sm-g990u1\\_galaxy\\_s21\\_fe\\_5g\\_uw\\_td-lte\\_us\\_128gb\\_samsung\\_g990&d=detailed\\_specs](https://phonedb.net/index.php?m=device&id=19575&c=samsung_sm-g990u1_galaxy_s21_fe_5g_uw_td-lte_us_128gb_samsung_g990&d=detailed_specs)

[8] PhoneDB: SM-G965U1 Galaxy S9+ TD-LTE US

[https://phonedb.net/index.php?m=device&id=13349&c=samsung\\_sm-g965u1\\_galaxy\\_s9plus\\_td-lte\\_us\\_samsung\\_star\\_2](https://phonedb.net/index.php?m=device&id=13349&c=samsung_sm-g965u1_galaxy_s9plus_td-lte_us_samsung_star_2)

[9] IFIXIT: Samsung Galaxy S21 Ultra Teardown

<https://www.ifixit.com/Teardown/Samsung+Galaxy+S21+Ultra+Teardown/141188>